walraven

**Environmental**
**Product**
**Declaration**

According to ISO14025+EN15804 A2 (+indicators A1)

This declaration is for:
**Walraven HD1501 Clamp BUP EPDM 1/2" 240-250mm**

Provided by:
**J. van Walraven Holding B.V.**

MRPI® registration:
**1.1.00932.2025**

Program operator:
**Stichting MRPI®**
Publisher:
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**www.mrpi.nl**

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**15-5-2030**

ECO PLATFORM EPD VERIFIED

MRPI milieu relevante product informatie

## COMPANY INFORMATION

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## MRPI® REGISTRATION

1.1.00932.2025

## DATE OF THIS ISSUE

15-5-2025

## EXPIRY DATE

15-5-2030

## SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by Anne Kees Jeeninga , Advies Lab Vof. The LCA study has been done by Arunkumar Kuppusamy, J. van Walraven Holding B.V.. The certificate is based on an LCA-dossier according to ISO14025+EN15804 A2 (+indicators A1). It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPDs of construction products may not be comparable if they do not comply with EN15804+A2. Declaration of SVHC that are listed on the 'Candidate list of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

## PROGRAM OPERATOR

Stichting MRPI®
Kingsfordweg 151
1043 GR
Amsterdam

## PRODUCT

Walraven HD1501 Clamp BUP EPDM 1/2" 240-250mm

## DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

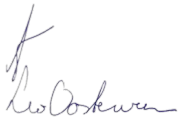
## DESCRIPTION OF PRODUCT

The Walraven HD1501 Clamp BUP EPDM 1/2" 240-250mm is a robust two-part clamp with locking bolts, anti-loss washers, and a $CO_2$-welded connection nut for secure pipe installation. Part of the BIS UltraProtect® 1000 system, it offers over 1,000 hours of corrosion resistance (ISO 9227) and features an EPDM lining for noise reduction up to 18 dB(A) per DIN 4109. Suitable for indoor and outdoor heavy-duty applications, ensuring durability, stability, and acoustic comfort.

## VISUAL PRODUCT

## MORE INFORMATION

https://www.walraven.com/int/products/standard-clamps/

| **Ing. L. L. Oosterveen MSc. MBA**<br>**Managing Director MRPI** | DEMONSTRATION OF VERIFICATION<br>CEN standard EN15804 serves as the core PCR [1] |
|---|---|
|  | Independent verification of the declaration and data according to ISO14025+EN15804 A2 (+indicators A1)<br>Internal: External: X |
| | Third party verifier: Anne Kees Jeeninga , Advies Lab Vof<br>  |
| | [1] PCR = Product Category Rules |

## DETAILED PRODUCT DESCRIPTION

Product Description
The Walraven HD1501 Clamp BUP EPDM 1/2" 240-250mm is a robust two-part pipe clamp engineered for the secure installation of heavy-duty piping systems in demanding environments. Featuring two locking bolts with anti-loss washers, a welded connection nut, and a heavy-duty design, it ensures maximum stability and long-term performance. The EPDM sound-insulating lining complies with DIN 4109, providing structure-borne noise reduction of up to 18 dB(A). As part of the Walraven BIS UltraProtect® 1000 system, the clamp delivers exceptional corrosion resistance suitable for both indoor and outdoor use.

Manufacturing Location
The clamp is manufactured in the Horka, Czech Republic using high-precision, environmentally responsible production methods.

Manufacturing Process Overview
Steel coil processing involves flattening and precision-cutting structural steel to produce the clamp's upper and lower parts. Stamping and bending shape the heavy-duty clamp bodies to exact tolerances, ensuring secure and stable fitting. Threading and welding secure a galvanized or zinc-plated nut to the clamp for reliable mounting. All steel components are coated with zinc in accordance with ISO 9227 to prevent corrosion. A thick EPDM rubber lining is applied to provide acoustic insulation and vibration damping per DIN 4109 standards. Final assembly includes heavy-duty screws, a POM anti-loss washer, and a captive nut holder, delivering the product fully assembled and ready for installation.

Electricity usage references:
Reference: 0569-pro & Elektriciteit, Nederlandse mix, bij consument, per kWh (73% grijs, 27% hernieuwbaar), Database: Ecoinvent v3.6 (Cut-off, NMD), GWP : 0.389 kg $CO_2$eq/kWh

Reference: market for electricity, low voltage | electricity, low voltage | Czech Republic, Database: Ecoinvent v3.6 (Cut-off, NMD), GWP : 0.936 kg CO2-eq/kWh

Environmental Performance
Zinc coating ensures long-lasting corrosion protection, minimizing the need for site-specific treatments. Steel, EPDM, POM, and other plastic components are selected for recyclability and low environmental impact. Metal and plastic offcuts generated during production are recycled within the supply chain to reduce waste.

Installation and Use Phase
The clamp's materials are free of volatile organic compounds, ensuring safe indoor air quality during installation. The necessary internal transport of Czech Republic to Netherlands has been accounted in the production process of A1-A3.

End-of-Life Considerations
Clamp components can be easily separated for recycling at the end of their service life. All main materials, including steel, EPDM, and plastics, are fully recyclable using standard industrial processes. Detailed material breakdowns and disposal guidance are available upon request.

Packaging and Transport
The product is shipped in recyclable cardboard packaging, with logistics optimized for environmental efficiency.

EPD Framework and Service Life
The environmental declaration follows EN 15804 + A2 and ISO 14025 standards, with a reference service life (RSL) of 50 years.

| Name - Half parts | |
|---|---|
| Steel - Lower part | |
| Steel - Upper part | |
| Steel - Hollow pan head screw | |
| Steel - Nut | |
| Rubber - EPDM | |

| Total Weight | 1568 g |
|---|---|

| Component (> 1%) | (%) |
|---|---|
| Steel (combined) | 87,10% |
| Rubber - EPDM | 10,20% |

## SCOPE AND TYPE

This study involves conducting a comprehensive Life Cycle Assessment (LCA) for the Walraven Clamps, aiming to analyze all life cycle phases from Cradle to Grave (A1–D) using the best available data. The assessment follows the full scope of LCA, meaning the product is evaluated not as a standalone item, but as part of a broader system aggregated with other materials and processed into other products. Consequently, the clamp becomes an integral component of a Declared Unit.

The LCA is performed using the Ecochain Helix software, leveraging background data from authoritative sources such as the Dutch Nationale Milieu Database v3.8 (based on Ecoinvent 3.6) and adhering to the NMD Bepalingsmethode 1.2 (2025) standard. This rigorous methodology ensures a detailed and transparent examination of the environmental impact of the Walraven Clamps across their entire life cycle from the extraction of raw materials (Cradle) through production, installation, and use, to final disposal or recycling (Grave).

The system boundary includes all relevant stages, up to and including Module D (benefits and loads beyond the system boundary). It excludes operational energy use (B6) and water consumption (B7) during the use phase. The environmental impact is declared per one piece of Walraven Clamp, inclusive of ancillary materials, installation, internal transport, and waste processing.

The reference service life is assumed to be 50 years, based on internal product owner data and supported by the European Technical Assessment (ETA) for Walraven Clamps, which confirms a minimum working life of 50 years under appropriate usage and maintenance conditions.

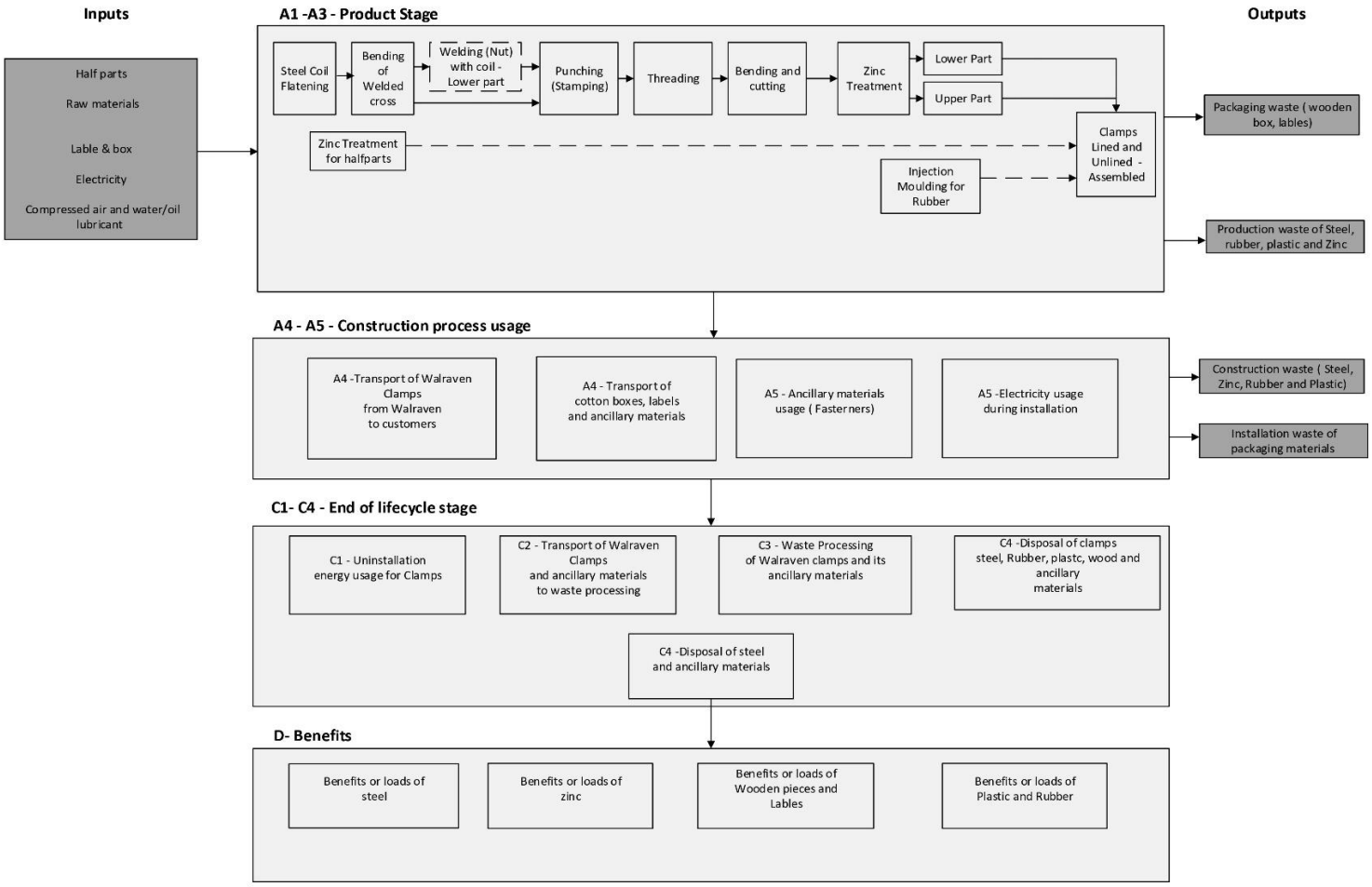
All significant inputs and outputs such as emissions, energy consumption, and material flows are accounted for. Materials representing less than 1% of the product's total weight may be excluded unless they are expected to contribute more than 5% to any environmental impact category. The cumulative environmental impact of excluded materials shall not exceed 5% for any given category.

This comprehensive approach ensures a scientifically sound and holistic understanding of the Walraven Clamp’s environmental footprint throughout its full life cycle.

| PRODUCT STAGE | | | CONSTRUCTION PROCESS STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Raw material supply | Transport | Manufacturing | Transport gate to site | Assembly | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse - Recovery - Recycling potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| x | x | x | x | x | ND | ND | ND | ND | ND | ND | ND | x | x | x | x | x |

X = Modules Assessed

ND = Not Declared



## REPRESENTATIVENESS

The aggregation was done by choosing the reference product as Walraven HD1501 Clamp BUP EPDM 1/2" 240-250mm. The remaining products which are aggregated in the same group by following the 20% allocation and worst case scenario as per the EN 15804+A2 & NMD Bepalingsmethode v1.2 (2025) are listed below:

Walraven HD1501 Clamp BUP EPDM M16 240-250mm
Walraven HD1501 Clamp BUP EPDM 1/2" 217-227mm
Walraven HD1501 Clamp BUP EPDM M10/12 217-227mm
Walraven HD1501 white EPDM 1/2" 217-227mm
Walraven HD1501 Clamp BUP EPDM M16 217-227mm
Walraven Heavy Duty Clamp Stainless EPDM M16 DN300 12" 315-325mm
Walraven BISMAT® 1000 Stand Pipe Clamp M10 GA zinc plated DN200 210mm
Walraven Heavy Duty Clamp Stainless EPDM M16 DN250 10" 265-275mm
Walraven HD1501 Clamp BUP EPDM M10/12 203-213mm
Walraven HD1501 Clamp BUP EPDM 1/2" 203-213mm
Walraven HD1501 Clamp BUP EPDM M16 203-213mm
Walraven HD1501 Clamp BUP EPDM 1/2" 194-204mm
Walraven HD1501 Clamp BUP EPDM M10/12 194-204mm
Walraven HD1501 Clamp BUP EPDM M16 194-204mm
Walraven Heavy Duty Clamp Stainless EPDM M16 240-250mm
Walraven HD1501 Clamp BUP EPDM 1/2" 178-188mm
Walraven HD1501 Clamp BUP EPDM M10/12 178-188mm
Walraven HD1501 Clamp BUP EPDM M16 178-188mm
Walraven HD1501 Clamp BUP EPDM 1/2" 159-169mm
Walraven HD1501 white EPDM 1/2" 159-169mm
Walraven HD1501 Clamp BUP EPDM M10/12 159-169mm
Walraven HD1501 white EPDM M10/12 159-169mm
Walraven HD1501 Clamp BUP EPDM M16 159-169mm

## ENVIRONMENTAL IMPACT per functional unit or declared unit (indicators A1)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADPE | kg Sb eq. | 4,58E-02 | 6,70E-06 | 4,33E-06 | 4,58E-02 | 8,04E-07 | 2,29E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,88E-06 | 3,37E-06 | 3,07E-09 | -1,06E-04 |
| ADPF | MJ | 8,03E+01 | 4,15E+00 | 5,67E+00 | 9,01E+01 | 4,81E-01 | 3,69E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,12E+00 | 8,76E-01 | 9,31E-03 | -1,87E+01 |
| GWP | kg CO2 eq. | 5,07E+00 | 2,74E-01 | 4,21E-01 | 5,77E+00 | 3,15E-02 | 2,64E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,34E-02 | 5,31E-01 | 3,29E-04 | -1,12E+00 |
| ODP | kg CFC11 eq. | 4,15E-07 | 4,84E-08 | 2,37E-08 | 4,87E-07 | 5,58E-09 | 2,14E-08 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,30E-08 | 8,30E-09 | 1,10E-10 | -8,58E-08 |
| POCP | kg ethene eq. | 4,75E-03 | 1,78E-04 | -1,21E-04 | 4,81E-03 | 1,90E-05 | 1,35E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 4,43E-05 | 5,42E-05 | 3,50E-07 | -2,22E-03 |
| AP | kg SO2 eq. | 2,86E-02 | 1,57E-03 | 1,42E-03 | 3,16E-02 | 1,38E-04 | 1,43E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,23E-04 | 6,29E-04 | 2,41E-06 | -4,15E-03 |
| EP | kg (PO4) 3 eq. | 4,07E-03 | 2,71E-04 | 3,03E-04 | 4,64E-03 | 2,72E-05 | 2,16E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 6,34E-05 | 8,98E-05 | 4,64E-07 | -4,93E-04 |

Toxicity indicators and ECI (Dutch market)

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HTP | kg DCB eq. | 9,29E+00 | 1,18E-01 | -1,65E-02 | 9,39E+00 | 1,33E-02 | 4,42E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,09E-02 | 7,33E-02 | 1,49E-04 | -6,60E-01 |
| FAETP | kg DCB eq. | 1,55E-01 | 3,32E-03 | 2,02E-03 | 1,60E-01 | 3,87E-04 | 8,38E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 9,03E-04 | 1,42E-03 | 3,53E-06 | 4,36E-03 |
| MAETP | kg DCB eq. | 2,97E+02 | 1,21E+01 | 1,03E+01 | 3,20E+02 | 1,39E+00 | 1,64E+01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,25E+00 | 6,00E+00 | 1,26E-02 | -2,66E+00 |
| TETP | kg DCB eq. | 5,63E-02 | 4,11E-04 | 2,03E-03 | 5,88E-02 | 4,68E-05 | 5,24E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,09E-04 | 2,50E-04 | 3,73E-07 | 4,56E-02 |
| ECI | euro | 1,30E+00 | 3,51E-02 | 2,94E-02 | 1,37E+00 | 3,79E-03 | 6,38E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 8,85E-03 | 3,73E-02 | 4,64E-05 | -1,40E-01 |
| ADPF | kg Sb eq. | 3,86E-02 | 2,00E-03 | 2,73E-03 | 4,33E-02 | 2,31E-04 | 1,78E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 5,40E-04 | 4,21E-04 | 4,48E-06 | -9,02E-03 |

ADPE = Abiotic Depletion Potential for non-fossil resources
ADPF = Abiotic Depletion Potential for fossil resources
GWP = Global Warming Potential
ODP = Depletion potential of the stratospheric ozone layer
POCP = Formation potential of tropospheric ozone photochemical oxidants
AP = Acidification Potential of land and water
EP = Eutrophication Potential
HTP = Human Toxicity Potential
FAETP = Fresh water aquatic ecotoxicity potential
MAETP = Marine aquatic ecotoxicity potential
TETP = Terrestrial ecotoxicity potential
ECI = Environmental Cost Indicator
ADPF = Abiotic Depletion Potential for fossil resources

## ENVIRONMENTAL IMPACT per functional unit or declared unit (core indicators A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GWP-total | kg CO2 eq. | 5,22E+00 | 2,77E-01 | 4,18E-01 | 5,92E+00 | 3,18E-02 | 2,68E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,41E-02 | 5,55E-01 | 3,35E-04 | -1,19E+00 |
| GWP-fossil | kg CO2 eq. | 5,19E+00 | 2,77E-01 | 4,17E-01 | 5,88E+00 | 3,17E-02 | 2,67E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,41E-02 | 5,31E-01 | 3,35E-04 | -1,19E+00 |
| GWP-biogenic | kg CO2 eq. | 2,17E-02 | 1,01E-04 | 6,73E-04 | 2,25E-02 | 1,18E-05 | 1,17E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,76E-05 | 2,37E-02 | 1,96E-07 | 0,00E+00 |
| GWP-luluc | kg CO2 eq. | 1,01E-02 | 1,07E-04 | 4,35E-04 | 1,06E-02 | 1,16E-05 | 5,62E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,71E-05 | 6,88E-05 | 9,34E-08 | 5,05E-04 |
| ODP | kg CFC11 eq. | 4,37E-07 | 6,07E-08 | 1,85E-08 | 5,16E-07 | 7,01E-09 | 2,30E-08 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,63E-08 | 9,56E-09 | 1,38E-10 | -8,88E-08 |
| AP | mol H+ eq. | 3,52E-02 | 2,06E-03 | 1,70E-03 | 3,89E-02 | 1,84E-04 | 1,77E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 4,30E-04 | 7,91E-04 | 3,18E-06 | -5,04E-03 |
| EP-fresh water | kg P eq. | 3,93E-04 | 2,69E-06 | 7,01E-05 | 4,66E-04 | 3,20E-07 | 2,14E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,47E-07 | 4,16E-06 | 3,76E-09 | -4,30E-05 |
| EP-marine | kg N eq. | 7,31E-03 | 6,66E-04 | 2,39E-04 | 8,22E-03 | 6,49E-05 | 3,87E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,51E-04 | 1,85E-04 | 1,09E-06 | -8,73E-04 |
| EP-terrestrial | mol N eq. | 8,10E-02 | 7,36E-03 | 2,91E-03 | 9,12E-02 | 7,15E-04 | 4,28E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,67E-03 | 2,14E-03 | 1,21E-05 | -1,02E-02 |
| POCP | kg NMVOC eq. | 2,66E-02 | 2,06E-03 | 3,78E-04 | 2,91E-02 | 2,04E-04 | 1,19E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 4,76E-04 | 5,75E-04 | 3,50E-06 | -6,49E-03 |
| ADP-minerals & metals | kg Sb eq. | 4,58E-02 | 6,70E-06 | 4,33E-06 | 4,58E-02 | 8,04E-07 | 2,29E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,88E-06 | 3,37E-06 | 3,07E-09 | -1,06E-04 |
| ADP-fossil | MJ, net calorific value | 7,36E+01 | 4,13E+00 | 6,13E+00 | 8,38E+01 | 4,79E-01 | 3,60E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,12E+00 | 8,91E-01 | 9,37E-03 | -1,43E+01 |
| WDP | m3 world eq. Deprived | 3,29E+00 | 1,43E-02 | 9,11E-02 | 3,40E+00 | 1,71E-03 | 1,53E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 4,00E-03 | 1,38E-02 | 4,20E-04 | -3,53E-01 |

GWP-total = Global Warming Potential total
GWP-fossil = Global Warming Potential fossil fuels
GWP-biogenic = Global Warming Potential biogenictotal
GWP-luluc = Global Warming Potential land use and land use change
ODP = Depletion potential of the stratospheric ozone layer
AP = Acidification Potential, Accumulated Exceedence
EP-freshwater = Eutrophication Potential, fraction of nutrients reaching freshwater end compartment
EP-marine = Eutrophication Potential, fraction of nutrients reaching marine end compartment
EP-terrestrial = Eutrophication Potential, Accumulated Exceedence
POCP = Formation potential of tropospheric ozone photochemical oxidants
ADP-minerals & metals = Abiotic Depletion Potential for non-fossil resources [1]
ADP-fossil = Abiotic Depletion for fossil resources potential [1]
WDP = Water (user) deprivation potential, deprivation-weighted water consumption [1]

Disclaimer [1]:

- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

## ENVIRONMENTAL IMPACT per functional unit or declared unit (additional indicators A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PM | Disease inci-dence | 3,47E-07 | 2,38E-08 | -6,73E-09 | 3,64E-07 | 2,85E-09 | 1,56E-08 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 6,65E-09 | 9,40E-09 | 6,17E-11 | -7,10E-08 |
| IRP | kBq U235 eq. | 3,32E-01 | 1,73E-02 | 3,45E-02 | 3,84E-01 | 2,01E-03 | 1,92E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 4,68E-03 | 4,29E-03 | 3,84E-05 | -1,10E-02 |
| ETP-fw | CTUe | 5,31E+02 | 3,63E+00 | 3,17E-01 | 5,35E+02 | 4,27E-01 | 2,52E+01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 9,96E-01 | 4,32E+00 | 6,08E-03 | -3,66E+01 |
| HTP-c | CTUh | 3,22E-08 | 1,23E-10 | -5,83E-10 | 3,17E-08 | 1,39E-11 | 1,58E-09 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,23E-11 | 9,14E-11 | 1,41E-13 | -2,57E-10 |
| HTP-nc | CTUh | 5,53E-07 | 3,93E-09 | 1,62E-10 | 5,57E-07 | 4,67E-10 | 3,71E-08 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,09E-09 | 4,43E-09 | 4,32E-12 | 1,80E-07 |
| SQP | - | 2,69E+01 | 3,42E+00 | 1,67E+00 | 3,20E+01 | 4,15E-01 | 1,60E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 9,69E-01 | 1,69E+00 | 1,97E-02 | -3,03E+00 |

PM = Potential incidence of disease due to PM emissions
IRP = Potential Human exposure efficiency relative to U235 [1]
ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]
HTP-c = Potential Comparative Toxic Unit for humans, cancer [2]
HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]
SQP = Potential soil quality index [2]

Disclaimer [1]:

- This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste.

Disclaimer [2]:

- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

## OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit (A1 en A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HWD | kg | 5,96E-03 | 1,01E-05 | -7,74E-06 | 5,96E-03 | 1,21E-06 | 2,92E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,83E-06 | 2,88E-06 | 1,40E-08 | -1,17E-04 |
| NHWD | kg | 1,39E+00 | 2,49E-01 | 3,37E-02 | 1,67E+00 | 3,04E-02 | 8,78E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,09E-02 | 3,52E-02 | 6,36E-02 | -1,11E-01 |
| RWD | kg | 2,83E-04 | 2,72E-05 | 2,89E-05 | 3,39E-04 | 3,14E-06 | 1,63E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,33E-06 | 5,10E-06 | 6,15E-08 | -2,94E-05 |
| CRU | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| MFR | kg | 0,00E+00 | 0,00E+00 | 2,64E-04 | 2,64E-04 | 0,00E+00 | 1,32E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 1,21E+00 | 0,00E+00 | 0,00E+00 |
| MER | kg | 0,00E+00 | 0,00E+00 | 1,60E-05 | 1,60E-05 | 0,00E+00 | 8,01E-07 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,50E-01 | 0,00E+00 |
| EEE | MJ | 0,00E+00 | 0,00E+00 | 5,37E-04 | 5,37E-04 | 0,00E+00 | 2,68E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 7,32E-01 |
| ETE | MJ | 0,00E+00 | 0,00E+00 | 9,23E-04 | 9,23E-04 | 0,00E+00 | 4,61E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,26E+00 |

HWD = Hazardous Waste Disposed
NHWD = Non Hazardous Waste Disposed
RWD = Radioactive Waste Disposed
CRU = Components for reuse
MFR = Materials for recycling
MER = Materials for energy recovery
EEE = Exported Electrical Energy
ETE = Exported Thermal Energy

## RESOURCE USE per functional unit or declared unit (A1 and A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PERE | MJ | 7,30E+00 | 5,05E-02 | 6,87E-01 | 8,03E+00 | 5,99E-03 | 4,01E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,40E-02 | 1,33E-01 | 7,58E-05 | -1,63E-01 |
| PERM | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PERT | MJ | 7,30E+00 | 5,05E-02 | 6,87E-01 | 8,03E+00 | 5,99E-03 | 4,01E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,40E-02 | 1,33E-01 | 7,58E-05 | -1,63E-01 |
| PENRE | MJ | 7,83E+01 | 4,39E+00 | 6,61E+00 | 8,93E+01 | 5,08E-01 | 3,84E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,19E+00 | 9,46E-01 | 9,95E-03 | -1,50E+01 |
| PENRM | MJ | 4,07E+00 | 0,00E+00 | 0,00E+00 | 4,07E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PENRT | MJ | 8,23E+01 | 4,39E+00 | 6,61E+00 | 9,33E+01 | 5,08E-01 | 3,84E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,19E+00 | 9,46E-01 | 9,95E-03 | -1,50E+01 |
| SM | kg | 5,47E-01 | 0,00E+00 | 7,72E-05 | 5,47E-01 | 0,00E+00 | 3,86E-06 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| RSF | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| NSRF | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| FW | m3 | 9,84E-02 | 4,88E-04 | 1,14E-02 | 1,10E-01 | 5,83E-05 | 5,16E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,36E-04 | 9,99E-04 | 1,00E-05 | -8,17E-03 |

PERE = Use of renewable primary energy excluding renewable primary energy used as raw materials
PERM = Use of renewable primary energy resources used as raw materials
PERT = Total use of renewable primary energy resources
PENRE = Use of non-renewable primary energy resources excluding non-renewable energy resources used as raw materials
PENRM = Use of non-renewable primary energy resources used as raw materials
PENRT = Total use of non-renewable primary energy resources
SM = Use of secondary materials
RSF = Use of renewable secondary fuels
NSRF = Use of non-renewable secondary fuels
FW = Use of net fresh water

## BIOGENIC CARBON CONTENT per functional unit or declared unit (A1 and A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BBCpr | kg C | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| BCCpa | kg C | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |

BCCpr = Biogenic carbon content in product
BCCpa = Biogenic carbon content in packaging

## CALCULATION RULES

Data Quality

Data flows have been modelled as realistically as possible. The assessment prioritizes primary data collected directly from production processes at the Walraven facility in the Czech Republic. When primary data were not available, reliable reference data from established databases were used to ensure consistency and accuracy. For Module A1, material composition data was provided directly by the manufacturer. Module A2 includes transport data from suppliers to the production site, while Module A3 captures actual energy consumption and waste generation from the 2023/2024 production records. Background processes were derived from the Nationale Milieudatabase v3.8, based on Ecoinvent 3.6.

Data Collection Period

The dataset represents production processes and operations conducted during the 2023/2024 period.

Methodology and Reproducibility

The life cycle assessment follows NEN-EN ISO 14040, 14044, and 14025, as well as EN15804+A2:2019, in accordance with the NMD Bepalingsmethode v1.2 (2025). Modelling and calculations were performed using Ecochain Helix v4.3.1. The study covers all relevant life cycle stages, including A1–A3 for raw material supply, transport, and manufacturing; A4–A5 for transport to site and installation; B1–B7 for use phase; C1–C4 for end-of-life processing; and D for benefits and loads beyond the system boundary, such as recycling and energy recovery potential.

Inventory and Allocation

The inventory captures quantities, energy use, emissions, and material flows across all processes. System boundaries were defined according to the modular approach described in EN15804+A2 and the NMD Bepalingsmethode v1.2 (2025). All production-site energy and material inputs were assigned to specific processes and then distributed to products using mass-based allocation. No secondary materials were used during production. End-of-life assumptions for steel and zinc follow standard NMD recycling guidance. Cut-off criteria were applied to ensure that any excluded flows per module do not exceed 5% of total mass or energy.

Data Sources

Primary data for the Walraven HD1501 Clamp BUP EPDM 1/2" 240-250mm, including transport, material composition, and installation, were obtained from the Walraven Czech production facility. Where site-specific data were not available, generic reference datasets for steel, zinc, and EPDM rubber were selected from NMD v3.8 and Ecoinvent 3.6 for life cycle modelling.

## SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Modules A1 to A3 represent the upstream and core product stages for the Walraven HD1501 Clamp BUP EPDM 1/2" 240-250mm. Module A1 models the extraction and processing of all relevant raw materials, including steel components (nuts, screws, clamp upper and lower parts), EPDM rubber, and zinc coatings. The input data is derived from 2023/2024 production records. Environmental profiles of materials are based on datasets from the National Milieudatabase (NMD) v3.8 and Ecoinvent v3.6, applying average market data assumptions (e.g., 57% primary and 43% secondary steel content) when supplier-specific data was unavailable.

Module A2 accounts for the transport of raw materials to the Walraven manufacturing facility. This module applies EN 15804+A2 methodological requirements, assuming average vehicle type (unspecified lorry) and a 50% load factor (full inbound, empty return). While transport distances are not detailed per material, all references and load assumptions follow those from the NMD v3.8 / Ecoinvent 3.6 framework.

Module A3 models the environmental impact at the production site. Inputs include electricity, packaging, auxiliary substances, and fuels consumed during the manufacturing processes. Production waste streams such as steel offcuts are accounted for and partially recycled. All modeling excludes capital goods under the cutoff rule in EN 15804+A2, as their contribution to total impacts is below the 5% threshold. Data is based on Walraven's Czech Republic site and corresponds to 2023/2024 operational values.

Module A4 represents transport of the finished clamp from the production facility to the installation location. A standardized distance of 150 km is used, based on the Bepalingsmethode v1.2. Transport is modeled using unspecified freight lorry with a 50% capacity utilization rate.

Module A5 includes product installation at the construction site. The clamp is assumed to be installed manually, with no energy requirement. A default 5% material loss is considered, representing handling losses of steel and rubber. Installation waste is directed to appropriate end-of-life processes.

The end-of-life pathway assumptions for waste generated during installation (as well as post-use) follow fixed values from the Bepalingsmethode v1.2 (2025):

| Material | Leave | Landfill | Incineration (AVI) | Recycling | Reuse |
|---|---|---|---|---|---|
| Steel, Zinc | 0% | 5% | 0% | 95% | 0% |
| Rubber/Plastic | 0% | 0% | 100% | 0% | 0% |

End-of-Life Management
Module C1 considers the manual dismantling of the clamp, which requires negligible energy input. Module C2 accounts for the transport of waste materials, with steel and zinc transported 50 km to recycling facilities and rubber transported 100 km to AVI incineration plants. Emissions from transport are modeled using NMD v3.8 lorry datasets.

Waste Processing
Module C3 covers waste treatment, where steel and zinc are assumed to be fully recycled, and rubber is incinerated with energy recovery, ensuring alignment with sustainable waste management pathways.

Final Disposal
Module C4 considers the disposal of residual waste. Five percent of steel and zinc is sent to landfill using the NMD disposal datasets, while rubber is fully incinerated and does not contribute to landfill flows.

Benefits Beyond the System Boundary
Module D quantifies the environmental benefits from recycling and energy recovery. Steel achieves a net substitution benefit of 52%, calculated as 95% recycling minus 43% secondary material content, representing avoided production of virgin material. Zinc recycling is modeled with 95% efficiency, and rubber incineration is assumed to yield 100% energy substitution, reducing reliance on fossil energy.

All life cycle modeling is conducted in accordance with EN 15804+A2:2019 + AC:2021 and the Bepalingsmethode v1.2 (2025), ensuring compliance with Dutch LCA reporting requirements and European harmonized EPD standards.

## DECLARATION OF SVHC

No substances that are listed in the latest “Candidate List of Substances of Very High Concern for authorisation” are included in the product that exceeds the limit for registration

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